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Synopses

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"To restore or not to restore primary teeth? That is the question"

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The restoration of teeth, whether permanent or primary, has evolved through time. It appears that restorative dentistry originated in ancient civilizations, and although the techniques practiced during these times were on a small scale, it still heralds the beginning of primitive dentistry. Historically, the beginning of reparative and restorative dentistry was introduced during the period of Pierre Fauchard (1678-1761), and through this period, dentistry evolved as a healing art. Conservative dentistry subsequently developed as a main branch of this art (35,37).

During the last twenty years we have witnessed quantum leaps in the technology in oral health care for the child and adolescent. This term oral health has most recently been defined by the Oral Health Strategy Group for England as; 'a standard of health of the oral and related tissues which enables as individual to eat, speak and socialize without active disease, discomfort or embarrassment and which contribute to general well being' (1). Oral health is a term, which encompasses a concept wider than simply healthy teeth, with dentist now responsible for the health of the oro-facial tissues.

When posed with the question, 'to restore, or not to restore primary teeth', we must consider our goals in maintaining oral health of children. An architect, designing a building, does not consider it in isolation, rather takes into account the effect it will have on adjacent buildings and those in the opposite side of the street. Equally, we must consider the way in which existing or planned structures will affect the building, as well as exploring the availability of services and a whole range of environmental and social problems. In addition understanding the properties of construction materials being used, and the engineering and aesthetic problems involved is essential.

Similarly, the dentist cannot consider restoration of an individual tooth in isolation, but rather needs to take into account the effect of the proposed restoration on the adjacent and opposing teeth, and their effects upon it. The dentist must also understand the factors present in the oral environment, and appreciate the clinical and biological properties of the materials that are used, and have an understanding of the engineering and aesthetic problems involved. Finally the dentist must be aware of the varied social requirements of the patient.

Before one can consider the question of 'to restore, or not to restore', it is essential to understand the primary dentition and its environment (9-11,26,33). This involves a degree of understanding regarding the normal appearance, structure and function of teeth and the surrounding tissues, knowledge of the etiology of dental caries and other conditions that lead to the loss of tooth structure, understanding the biological effects of the operative procedures which may be used and finally have an intimate knowledge of the oral environment, especially the role of saliva.

When evaluating the oral environment the question, "why do we have primary teeth", may enter the minds of extremely inquisitive individuals. There appears to be very little, if any information regarding reasons why, as humans, we are fortunate or possibly unfortunate to have two dentitions. It seems relatively impossible, to consider the notion that the evolutionary development of two dentitions, was a consequence of need for the replacement of the primary dentition due to dental caries alone. There are those among us who may consider the development of two dentitions to be a result of a need for the replacement of a dentition worn away due to environmental factors, such as diet.

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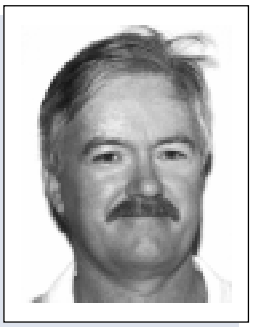

President's Report

VOLUNTARY LEADERSHIP AND ADVOCACY - THE INNER STRENGTH OF THE ANZSPD

Following on from the success of our recent conference in Adelaide, I would like to address the topic of voluntary leadership and advocacy. I suggest that it is the time for ANZSPD membership - as the professional dental body that exemplifies the future of oral health care for children - to expand our horizons and take a more active participation in this area. Individually, only a dentist that treats children can appreciate the joy, pride and the responsibilities that this task entails. However, the society mission and goals cannot be accomplished without the many contributions of it's members. We, the membership of ANZSPD must always make and enact the critical decisions that will advance our mission of improving and maintaining the oral health of infants, children, adolescents and persons with special needs.

Our future efforts must include an expanded participation at the political level. We need to allocate time, effort and resource to this advocacy mission. Members should take every opportunity to publicise the specific issues related to children's oral health including public access, equity and disease patterns. The time has never been better for us to effect the changes in legislation and public policy, which support children's oral health advocacy. Currently, state governments are formulating their budgets and health bureaucrats are conducive to appropriation issues. The message in all of this is that we have a golden opportunity in which we can facilitate future policy change and direction in this critical area.

THE INTERNATIONAL ASSOCIATION OF PAEDIATRIC DENTISTRY

PRESENTS

AWARD

The IAPD Bright Smiles/Bright Futures Award program, initially introduced in 1997, is currently accepting applications for its next contest. This award is sponsored by the International Association of Paediatric Dentistry with the support of The Colgate-Palmolive Company and is intended to honour innovative community-based programs in preventative dental education in children. The winner will be awarded $2,500 and economy-class airfare to attend the September 2001 IAPD meeting in Paris, as well as the opportunity to present their winning program at that meeting. For the runners up, there will be 2nd through to 5th place Special Recognition Awards and certificates will be given to all those who participate.

Individuals interested in participating should request a bright Smiles, Bright Futures Award program application from Dr Stephen J Moss, IAPD BSBF Award Coordinator, 380 Madison Avenue, 7th Floor, New York, NY 10017 USA.

If you should have any questions regarding the competition, contact Dr Stephen J Moss by email at *healthee@ix.netcom.com*, or by fax at: 1-212-856-4487 or Ms Elizabeth Reilly, IAPD Secretariat email: *iapd@fdi.org.uk*. The deadline for receiving applications for the final judging is February 1, 2001

ANZSPD itself has never been stronger. Our membership numbers continue to increase steadily and our stable financial base has permitted us to invite high profile international speakers to our conferences and visiting lecturer programs. Through the continued support of Colgate Oral Care, further prospects for the enhancement of future educational activities is promising. I encourage all members, particularly those involved in research and education, to support the "Bright Smiles, Bright Futures Award" at the next IAPD meeting. This information sharing initiative has developed and sponsored by the Colgate-Palmolive company to recognise preventive dental health programs worldwide and to reward the efforts of those dental health professionals committed to improving the oral health of children.

The future success of ANZSPD depends on the continued volunteer efforts of each and every member. As your president, it is an honour and a privilege to represent you to the general public and the profession. However, there is no doubt that ANZSPD is a people driven organisation. As past president Richard Widmer counselled me following my recent election to president of federal executive, many of the opportunities to shape our future were already behind me. From humble beginnings in the 1970's, successive presidents and their committees of the ASDC, NZSDC and ANZSPD have worked tirelessly to develop a leadership position on children's oral health issues within our countries. The branch councils of ANZSPD, all manned by volunteer members, are the true workforce of our organisation. It is at this level that the policy and actions of our society are conceived, planned and executed.

My belief is that our future is brighter than ever. Our success, as always, will depend on the each and every member to volunteer time, effort, expertise and vision. It is this commitment to excellence by our members that will permit us to meet every challenge of the new millennium. There are thousands of children in Australia and New Zealand who can greatly benefit from our continued expertise, effort and commitment.

Kerrod B Hallett

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Anthropology has traced the dentition of the human species from as far back as Pre-Neanderthals and lead to the conclusion that the presence of two dentitions dates back to this period (4,6). Why then do we have two dentitions?

Research analyzing teeth from archaeological sites have reported dentitions of a similar nature to that of present day (5-8). The exception involving the associated wear of these teeth and the pattern of dental caries. It seems that in prehistoric times, dental caries occurred most frequently at the cemento-enamel junction, which differs from the present (6). These finding appear to be found throughout the literature examining prehistoric occlusions.

Is it realistic to consider that through the development and evolution of complex morphological structures, humans possess two dentitions as a direct need for mastication and the resultant changes which ensue as a result of our diets? It appears that this notion, despite the lack of evidence, which exists, may be the reason behind the development of two dentitions. Regardless of the actual scientific rationale responsible for two dentitions, it is obvious evolution has not viewed these teeth to be expendable, but rather to have an invaluable function, and in some way contribute to the continuation of the human race.

Presented with the evidence that humans evolved as a dominant species, and that this dominant species has evolved with two dentitions, is it not our responsibility to preserve the primary dentition until its natural exfoliation?

The reasons for restoring permanent teeth to the highest possible standard as soon as disease, injury or deformity is diagnosed, are self-evident. However, do the same rules apply for primary teeth? What are the advantages of restoring these teeth, as opposed to extraction or merely keeping them under observation?

There are many questions that remain unanswered, or may in fact have several different answers. To begin with, there is no right answer, rather opinions, which must be carefully evaluated prior to making any formal decision. What we need to do is make sure our decisions are evidence based.

Is it true to say, that there is absolutely no reason for leaving primary teeth decayed and untreated in a child's mouth? No other branch of medicine would willingly leave disease untreated. Yet despite this, there are many clinicians that not only advocate leaving primary decayed teeth in a child's mouth, but also practice this treatment, or in some eyes, commit dental neglect. Yet there are certain situations where we may leave untreated carious primary teeth in a child's mouth. Where our interventions are sensibly planned rather than automatic.

A recent article by a leading British Paediatric Dentist, entitled "Do we still care about children's teeth?" (34), reported that despite a decline in dental caries in the child population, the dmf for 5-year-olds in some northern areas of the United Kingdom is increasing. Research has also identified an increase in the missing component while a decrease in the filled component (2,3,34). The conclusion: more primary teeth are being extracted, while less are being restored. Why?

"...There is virtually no reason for leaving primary teeth decayed and untreated"

Is it possible that as dentist we have in fact become complacent on our views of restoring primary teeth, and that we may have emerged as the only health profession to leave an active disease untreated? Do we support the view that primary teeth are expendable? The increased trend to remove rather than restore primary teeth is worrying to paediatric dentists. Is it possible that dentists do not feel able to restore primary teeth? There are numerous textbooks detailing restoration techniques for primary teeth (12-19,50,51). Perhaps it is a result of lack of training in behaviour management techniques? Is the old philosophy of waiting, leaving active decay, and hoping that it does not lead to any problems still a common practice? These are all unacceptable, and are considered by many as dental neglect.

Prior to addressing the ever increasing opinion that primary teeth are expendable, it is important to outline why as paediatric dentists, we restore primary teeth.

It is my opinion, that there is virtually no reason for leaving primary teeth decayed and untreated. I use the term virtually, as an exception may involve a carious tooth which is close to exfoliating, causing no symptoms, and identified as having no potential of causing any symptoms prior to it's exfoliation (42). The idea of primary teeth exfoliating, and thus not requiring any treatment must not be taken as an excuse not to restore, as careful assessment of the patient, dental age, extent of carious involvement, as well as potential to cause symptoms must all be evaluated.

Too often, children present in pain or abscessed teeth with a history of regular attendance at a dentist who has 'been watching the teeth as they don't need filling yet'. Parents can be upset that active disease has been left untreated, the result of which can lead, sooner or later, to unnecessary discomfort, pain and suffering, not only experienced by the child but by the family.

The decision to treat primary teeth should be a natural thought process as it is when confronted with permanent teeth with active decay.

Once a decision has been made to treat a carious tooth, a further decision has to be made as to whether to restore or remove it. This statement raises the question of deciding on the value of the tooth.

The value of a primary tooth may be considered under the following headings:

- Aesthetic
- Functional, including mastication and speech
- Orthodontic
- Psychological development
- Past dental experiences

It should be stressed, that despite an analysis of the 'value of teeth', numerous other factors must be assessed in any decision regarding the potential restoration of primary teeth. The decision whether or not to restore should take into account the whole

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patient, with due consideration of such issues as their wishes and motivation, any medical, physical or learning disability, as well as any emotional or behavioural problem (9-11,36).

Each child is an individual and treatment should be planned to provide the best that is possible for that individual. Too often treatment is given which is most convenient for the parent or more likely the dentist.

Is it really in the best interest of the child to remove a tooth which can be saved? It has been reported that general anaesthesia is still widely used for the removal of teeth in young children, despite the obvious risks of death, its unpleasantness, and the cost involved (30,32). It would seem that this procedure is often prescribed because of the preference of the dentist rather than that of the parent or child (21,28-30).

In any decision process, whether an architect designing a building, or a dentist deciding whether to restore or not to restore, there are a series of steps which must be climbed in order to reach a point at which the decision reflects the situation as a whole (50,51).

These steps involve an evaluation of:

1. The child: their past and present medical and dental history, social and family history, any learning or behavioural problems, their wishes and those of the parents (11,26).

2. The tooth: evaluation of the teeth involved, whether anterior or posterior, whether first primary molars or second primary molars. At this stage in deciding to restore or to remove, it is vital to assess each tooth, and the effect removal of that tooth may have on the rest of the dentition, or the effect removal may have on the child, or parents (33, 35, 37, 46, 51).

3. The stage of disease: it is obviously easier for both the dentist and the child to restore teeth at an earlier stage of carious involvement. Progress of caries may lead to pulpal involvement, and make subsequent restoration more difficult (21,24,51).

4. The extent of the disease: a large number of teeth requiring treatment may put a strain on the young child or the parent and/or the dentist (21).

It is the responsibility of all dentists to maintain the health of the oral and related tissues to a standard which will enable individuals to eat, speak, socialize, without active disease, discomfort, or embarrassment and which contribute to general well being. It is these objectives which primarily form the basis of any decisions to restore or to remove and thus must be incorporated in any decision making process. The reasons we restore teeth are consequently borne from our principle objectives of maintaining oral health.

"Too often treatment is given which is most convenient for the parent or the dentist"

In general, the aesthetic value of the dentition is primarily due to the anterior segment, including the incisor and canine teeth (17). The etiology of nursing caries has been well discussed and associated with salivary factors as well as inappropriate prolonged nursing of infants, whether by bottle-feeding, breast-feeding or inappropriate use of a pacifier.

The associated clinical presentation follows a definite pattern, with the maxillary incisors affected most severely, while the mandibular incisors remain unaffected. It is therefore imperative that any decision to restore cariously involved anterior teeth is accompanied by definitive guidelines regarding infant feeding techniques (33).

It is obvious to all that given an opportunity to retain carious anterior teeth, through restoration, is the choice any parent, child or dentist would make (14,18,19). However the decision to restore carious anterior teeth is one based somewhat on maintaining facial aesthetics, as a young child with teeth, will often look healthier, and tend to socialize with those children of similar age and dental appearance, more than those children missing anterior teeth (17).

Research has shown that young children are just as aware of their appearance as adults and the positive change in cooperation after the improvement in appearance is often remarkable (18,20).

There has also been research indicating that induced oligodontia, as a result of extractions may affect the social development of the young child (20). Given this evidence, and realizing that these early years of development are probably the most influential, shouldn't this be reason enough to encourage us to restore more, rather than extract?

However there is conflicting evidence, indicating that removal of anterior teeth does not effect social interactions between children, and thus removal of anterior teeth appears to have little effect on social skills and self-image of children (27). Data from the same researchers have also concluded that removal of anterior teeth did not result in any noticeable behavior changes.

Despite the conflicting evidence it is important to remember that as dentists we remain part of the health profession. Membership in this society affords the goal to reach the pinnacle of health and well-being. It seems strange that any health profession would thus elect to remove perfectly restorable teeth given that there may in fact be a chance that our actions could effect our patients' future development. As small as this may be, the possibility still exists, and our aims should involve elimination of this chance, and in this case we should aim to restore, rather than remove if given the opportunity.

It is these same values that we should and must apply to all primary teeth. All teeth have aesthetic value, and at all time; emphasis should be placed on the restoration of these teeth as opposed to their removal (12,13,15,16).

The functional aspect of teeth is one of a multi-factorial nature, with many varied roles, each equally important, and all must be considered in any decision making process.

Naturally teeth are used for mastication and it is obvious that restoring teeth will aid in maintaining the masticatory role teeth play. It is thus obvious that any dental treatment should therefore

be aimed at restoring teeth and subsequently sustaining the masticatory function of the oral cavity. Several reports have indicated children with induced oligodontia experienced difficulties eating (20). The difficulties experienced in mastication may lead to a multitude of subsequent problems, the most serious of which is 'failure to thrive'. It is consequently our responsibility as health professionals to maintain the masticatory function of the oral cavity, thereby reducing the possible array of problems encountered as a result of missing teeth. It should be stressed that the restoration of these teeth needs to be at the highest standard to maintain optimal masticatory function. There are numerous publications detailing optimal restorative techniques, which must form the basis of any restorative treatment performed (9-22).

Teeth and the oral cavity play an equally important role in speech development, and the ability to articulate certain speech sounds is dependent on many related factors among which is the presence of the anterior maxillary teeth (43,44). The teeth serve as useful landmarks for the tongue and play a prominent role during the production of certain speech sounds. Defective speech may be caused by a variety of factors other than the loss of teeth, including malocclusion, tongue-tie, cleft palate and shortness of soft palate. It cannot be emphasized enough how important the correct development of speech is to a child's overall well being.

Loss of teeth may be implicated in the distortion of the continuant consonants (*v, f, th, z and s*) since their correct production necessitates forcing an air stream through an opening in the oral cavity small enough to produce friction noises. Consequently loss of teeth would permit too much air to escape, distorting sound production. The anterior teeth appear to be particularly important for the correct production of the *s* and *z* sounds. Research by Fant and Jensen (43) identified the anterior teeth to be the source of sibilance in the *s* sound.

Snow and coworkers (44) research indicated that children with missing or abnormal upper incisors misarticulate sounds more frequently and consistently compared with those children with an intact dentition. Conversely evidence exists that missing teeth will not influence the speech patterns of many children (44).

Despite the conflicting evidence, it appears that the majority of dentists and speech pathologists suggest that minor residual effects may accrue if the extraction of the anterior maxillary incisors is performed in children younger than 3 years of age (20,43,44). This tendency may increase the younger the child is at the time of the extractions. However it appears to be the general consensus that the premature loss of the four maxillary anterior incisor teeth does not appear to have any long-term effect on the speech development of children above the age of 5 years (43,44).

"Teeth and oral cavity play an equally important role in speech development"

With the evidence indicating that the premature removal of teeth may affect speech development, it becomes apparent that the restoration of primary teeth is extremely important and should be performed given the opportunity.

A further function of teeth, or conversely a possible result of premature removal of teeth, lies in the possible psychological disturbance which may arise. It has been shown that premature loss of anterior teeth is associated with a degree of psychological trauma (19). This may culminate in a reluctance to attend school and hence socialize. The effect of premature removal of teeth, or perhaps avoidance to restore carious anterior teeth, and the resulting psychological trauma, which may ensue, are extremely critical issues to consider, as these early years are crucial in psychosocial development. It is also important to realize that premature removal of teeth does not always result in behaviour changes, as was shown by Koroluk and coworkers (27). Their research showed that for the majority of children, premature removal of teeth resulted in no behaviour changes, no problems in socializing and no alteration in speech development. Despite the conflicting evidence, the risk of psychological trauma as a result of premature removal of teeth must be avoided whenever possible and the restoration of teeth advocated.

The changes from primary to permanent dentition consist of a complex phenomenon, which is composed of a variety of physiological adaptations of occlusion during this period. The exfoliation of the primary teeth, the eruption of their permanent successors, and the occlusion are independent, yet occur in harmonious sequence (36,48). Concurrently, there is development of the craniofacial structures, as well as the neuromuscular system, that when completed, lead to a homeostasis of the stomatognathic system (36).

Ideally, as the occlusion develops from the primary through the transitional stage to the permanent dentition, a sequence of events occurs in an orderly fashion. These events result in a functional, aesthetic, and stable occlusion (25). There are many morphogenic and environmental influences which manage the occlusal development, and a disorder in any of these elements may influence the occlusion. Among these elements, is the importance and value of primary teeth (23,39-41,49).

The harmful effects of premature loss of one or more primary teeth vary in patients with the same age and stage of dentition. Conclusions drawn from observing small groups of children for a short period of time have resulted in diverse and contradictory opinions concerning the effects on occlusion following the loss of a primary tooth. In some instances, a normal or at least functional occlusion may develop. However, the majority of large, longitudinal studies have shown that in most patients premature loss of a primary tooth will lead to some forms of loss of arch space, drifting, or tilting of teeth (39-41,45-49,52). These changes in occlusion, created by premature loss of a tooth, or teeth, may later progress to a need of orthodontic treatment.

Given the increased risk of future orthodontic treatment as a result of premature loss of primary teeth, the decision to restore as opposed to remove,

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given the opportunity, should be the initial reaction to greet any dentist. The reaction motivated especially as a decision to restore may lessen the need for orthodontic intervention.

There are numerous other reasons why we should restore rather than remove teeth. These concern the psychological development of the child and the effect teeth; restoration, removal, or neither may have upon the development and psychological well being of children. It seems impossible that any action will not have future effects. Not just on the oral cavity, but also more importantly on the psychological state of any individual.

Examining research concerning the general opinion populations have of dentists, there appears to be one universal feeling, namely fear. An analysis of reasons for the development of this strong emotion often stem from early childhood experiences. It is these childhood experiences, which at the time may seem inconsequential, but given the knowledge we have of the emotional state of so many adults attending the dentist, these experiences are far from insignificant. They appear to dictate future psychological attitudes towards oral health practices, dentists and perhaps health behaviour in general.

The restoration of teeth consequently serves not only to avoid pain and infection, improve aesthetics, mastication, speech, and occlusion, but also can possible serve to mould attitudes towards oral and general health, both in the short and long term. Paediatric dental practitioner want to make all these early experiences positive and use these first visits to introduce the dental environment in a non threatening way. The "Gentle" placement of the humble restoration can be an important first step.

There appears to be more than enough reasons to promote the restoration of savable teeth, as opposed to their removal. We should aim to restore not only for the scientific rational, but for the deeper and equally, if not the more important goal, of improving oral health attitudes and creating children with positive attitudes towards oral health.

Where do we go from here? Is it possible to improve global education into the reasons why primary teeth are restored, or eliminate prehistoric treatment philosophies? The task at hand may appear enormous, but given the rewards to be gained, a greater emphasis is required to shift the pendulum towards the side of the conservation of teeth. "One small step for adults, one giant leap for all children"

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Abstracts

2000 COLGATE ORAL CARE PAEDIATRIC DENTISTRY GRADUATE STUDENT AWARD

The paper presented by Dr Sam Gue was judged to be the winner of the Colgate Oral Care in Paediatric Dentistry Graduate Student Award. This paper will be printed in full in a forthcoming edition of Synopses.

Editor.

THE APOPTOTIC RESPONSE OF ENDOTHELIAL CELLS TO PULSATILE AND OSCILLATORY SHEAR STRESS

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The present study aims to determine and characterise the effects of both pulsatile and oscillatory shear stress upon apoptosis in cultured human endothelial cells. The actual mechanisms whereby the building blocks of blood vessels, endothelial cells regulate their specific predisposition is not fully understood. It is known that excess blood vessels are removed by apoptosis of endothelial cells, however the full complement of signals and factors responsible for this have not been fully defined. It is thought that the factors, which regulate endothelial cell apoptosis, are also responsible for microvascular remodelling, as well as, one of the many factors thought to be involved in the pathogenesis of atherosclerosis. Human umbilical vein endothelial cells (HUVEC) were grown to confluence in small tissue culture flasks and triplicate flasks exposed to shear stress by further incubation on a standard laboratory rocker placed in a cell culture incubator. Control static cultures were incubated in identical media but without exposure to shear stress. Experiments were performed with culture media known to have different effects on HUVEC apoptosis: 20% supplemented calf serum (SCS) (stable tissues, minor levels of apoptosis); 4% Serum albumin (Alb) (minor tissue remodelling, moderate levels of apoptosis) and M199 alone (major tissue remodelling, high levels of apoptosis). After 24hrs of incubation, surviving cell number was determined in cell counts of remaining adherent cells. Apoptosis was confirmed on the basis of morphology and ultrastructure. Loss of endothelial cell adhesion was found to be an early event in cultured endothelial cells apoptosis and was further exploited to quantitate apoptosis. The combination of oscillatory and pulsatile shear stress generated from the rocking platform induced increased levels of endothelial cell apoptosis in all three media. Student's t-tests statistics confirmed a significant difference exists between the experimental and control groups. The data suggests that the effects of shear stress, both oscillatory and, or pulsatile may be one of the factors affecting endothelial apoptosis and may play a significant role in microvascular remodelling, as well as being involved in the pathogenesis of atherosclerosis. Further research identifying the type and quantity of shear stress responsible for these observations is required.

Above: Dr Sarah Raphael congratulates Dr Sam Gue, winner of the Colgate Oral Care in Paediatric Dentistry Graduate Student Award, on behalf of Colgate.

DENTAL EROSION

Kathryn Ayers MDS (Otago) 1999

The prevalence of tooth surface loss was investigated in a stratified random sample of 104 children aged 5-8 years. Each child received a dental examination, and the parent/guardian completed a questionnaire, which sought information on potential risk factors for tooth surface loss. Eighty-two percent of children had at least one primary canine or molar tooth with dentine exposed. Over half of this group also had cupping present.

Weaning from the breast or bottle after 12 months of age was associated with less severe tooth wear of primary canines and molars, and a decreased prevalence of cupping of the primary canine teeth.

A history of drinking juice from a bottle or feeding cup was associated with a higher prevalence of cupping involving the upper first deciduous molars. Children who had consumed juice from a bottle or feeding cup more frequently showed a tendency for more cupping of all teeth, with significantly more cupping of the maxillary right primary canine and the maxillary right first primary molar. Children who consumed citrus fruit at least 2-3 times per week tended to have more cupping, with significantly more cupping of the maxillary right primary second molar than those who ate citrus fruit less often.

Tooth surface loss occurs commonly in children. Late weaning may be protective against tooth surface loss in the primary dentition while drinking juice from a bottle or feeding cup may result in an increase in tooth surface loss.

MOUTHGUARD USE AND INJURY EXPERIENCE OF VICTORIAN BASKETBALL PLAYERS.

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The value of mouthguards (MG's) for injury prevention is well recognised by the dental profession. Whilst their use in some sports, for example the various football codes has been consistently demonstrated as being beneficial few have studied their value in basketball (BB). This project aimed to:

1. quantify the use of MG's by BB

players before and after a promotional intervention;

2. assess player attitudes on the value of MG's for injury prevention;

3. review their orofacial injury experience; and

4. assess the effectiveness of an intervention.

Two questionnaires were issued to a convenience sample of 496 BB players in Victoria. Players were recruited as: youth (12-15yr olds, n=208) and adults (18 yrs and over, n=289); distribution was across all levels of Victorian BB from social to elite. A baseline questionnaire was distributed, followed by an intervention, which included oral and written information about MGs with reference to BB and a MG template. The follow-up questionnaire was mailed to all participants at 10-12 weeks with two reminders.

Completed follow-up responses were: youth, n=135 (65.0%); adult, n=157 (54.3%). Wear of MGs at baseline was low 22.2% (youth, 30.8%, adult, 21.1%), in spite of their recognised value in providing protection against orofacial injuries (youth, 84.1%; adult, 93.4%); minimal change was observed at follow-up after the intervention.

Amongst MG wearers at baseline, regular use was low (at training, 24.8%; at games, 61.6%). Private dentists rather than a sporting team dentist constructed most mouthguards worn by participants. Previous orofacial injury was reported by 23.2% (youth, 16.5%; adult, 29.6%); this experience was associated with significantly increased MG wear (to 37.4%; $p<0.05$).

A direct entry logistic regression analysis was used to examine the population of mouthguard wearers further. The results suggested that two predictor variables tested were related to mouthguard wear: previous injury and the age group of the participant. Despite being able to readily predict the non-wearers of MGs, the predictive ability of the equation for wearers was particularly poor, being able to detect only 9 wearers from the total of 117 participants who had ever worn a mouthguard for basketball.

At follow-up, only 34 reported having had a MG constructed from the template provided (youth, n=17; adult, n=17). Of these 19 had previously reported having worn a mouthguard for basketball. Whilst analysis indicated differences between the youth and adult populations, the overall pattern of a disappointingly low mouthguard use was similar. Despite the wide recognition of the value of MG's, the intervention used had little effect on promoting their use. A better appreciation of injury incidence strengthens the argument for the promotion of mouthguards in basketball.

As the total variance in mouthguard wear that was predicted by the participant characteristics was relatively low, clearly, other factors may underlie why a person does or does not wear a mouthguard in basketball. The potential for the development of the role of general and paediatric dentists within thearea of sports dentistry is thereforegreat.

This study was supported by The University of Melbourne School of Dental Science Research Committee, the Australian and New Zealand Society of Paediatric Dentistry and Sportsguard Pty Limited.

EVALUATION OF THE MECHANICAL PROPERTIES OF PRIMARY TEETH

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Existing methods of measuring the mechanical properties of tooth tissue are subject to significant experimental error. The aim of this study was to determine the hardness and elastic modulus of primary enamel and dentine using an ultra Micro Indentation System (UMIS).

Primary molar teeth were sectioned, set in resin and polished. 30 indentations were made in enamel and dentine using a Berkovitch indentor. 15 indentations were subject to a load of 50mN and 15 to a load of 150mN. An automated computerised system converted the force/penetration graph for each indentation in to a hardness vs depth graph from which values for the mean hardness and elastic modulus were calculated. The hardness of enamel ranged from 4.66 +/- 0.23 GPa to 5.15 +/- 0.53 GPa at 50mN and 4.64 +/- 0.22 to 5.12 +/- 0.34 GPa at 150mN. The hardness of the dentine ranged from 0.78 +/- 0.07 at 50mN to 0.76 +/- 0.03 to 1.03 +/- 0.08 GPa at 150mN. Young's modulus for enamel varied from 74.47 +/- 2.85 GPa to 99.94 +/- 3.95 GPa at 50mN to 73.31 +/- 8.36 Gpa to 95.15 +/- 8.36 GPa at 150mN. Whilst for dentine the modulus varied from 18.23 +/- 0.81 GPa to 23.97 +/- 0.72 GPa at 50mN to 16.39 +/- 0.31 to 22.53 +/- 1.03 at 150mN.

Using linear regression analysis a significant relationship could be shown between the hardness and the elastic modulus for both enamel and dentine when loaded to 150mN but only for dentine at 50mN ($p<0.01$). In general the elasticity of tooth structure increased as the hardness increased. The UMIS offers a simple and reproducible method of measuring basic mechanical properties of small samples of enamel and dentine.

IS ASTHMA A RISK FACTOR FOR DENTAL CARIES?

FINDINGS FROM A COHORT STUDY

Alison Meldrum

The international literature presents few studies investigating the relationship between asthma and dental caries. There is strong biologic credibility to an association between caries and asthma, and between caries and some asthma pharmacotherapies, but the few published studies have produced conflicting outcomes and equivocal conclusions. This reflects both the complex aetiologies and diagnostic difficulties of two chronic, variable diseases, and the limited power of small cross-sectional studies where associations may be of small magnitude.

There are no reports of cohort studies which identify both exposure (asthma) and the outcome of interest (dental caries) using either prospective or retrospective design. Such incidence studies would provide the most direct measure of caries risk among asthmatics, but the study design is typically both time consuming and expensive. The aim of this study was to test the hypothesis that, in New Zealand, childhood asthma is associated with increased caries experience, by examining the association over time between asthma and caries increment while controlling for socioeconomic

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status, oral hygiene, sex, and the persistence of asthma.

Method

The study participants were children enrolled in the Dunedin Multidisciplinary Health and Development Study (DMHDS), an ongoing longitudinal study of the health, development and well-being of a large sample of young New Zealanders. For the purposes of the current study, pre-existing DMHDS records of identifiable asthmatic children provided low cost dental and sociological data while requiring no further contact with participants.

Secondary analysis of data from several phases of the DMHDS produced estimates of asthma and caries experience at various ages. Study members were identified as wheeze-determined asthmatics (WDA) and/or medication-determined asthmatics (MDA), and for each group. Long-term asthmatics were those identified as such at each of ages 9, 11, 13, and 15 years; very long-term asthmatics were those who were asthmatic at age 5 years and also asthmatic at age 9, 11, 13 and 15 years. The age 15-18 net caries increments of asthmatics and non asthmatics were compared using both approaches. Surface-specific caries increments were also compared.

Results

Of the 781 participants, 39 (5.0%) were MDA, 56 (7.2%) were WDA, and 36 (4.6%) were both MDA and WDA. A smaller group of 9 (1.2%) were asthmatic at age 5 years and both MDA plus WDA. In this group the overall mean net DFS increment was 3.00 (sd, 4.03) while the pit-and-fissure net increment was 2.77 (sd, 4.27). Among MDAs the net increments were 2.33 (sd, 4.80) and 1.44 (sd, 2.85); among the WDAs 2.39 (sd, 4.12) and 1.55 (sd, 2.53); and among those who were in both groups (MDA/WDA) 2.59 (sd 4.40) and 1.67 (sd, 2.80) respectively.

The Phase V plus MDA/WDA showed a higher net age 15 18DFS increment for pits and fissures ($p=0.04$), and this was due to their higher FS increment in pits and fissures ($p=0.05$). Neither the MDAs, the WDAs nor the WDA/ MDA (both) groups had higher caries increments than the rest of the sample.

Conclusion

It is concluded that there is little evidence for a strong association between asthma and caries, although New Zealand adolescents taking long-term anti-asthma medication may have a higher risk of pit and fissure caries than other adolescents. The hitherto unreported surface-specific analysis of caries increment suggests a specific pattern of caries risk among this group of adolescent asthmatics. A preventive regime which targets pit and fissure caries may be indicated for young asthmatic patients.

OCCLUSAL VARIATION IN THE PRIMARY DENTITION: A STUDY OF AUSTRALIAN TWINS AND SINGLETONS

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An understanding of variation in the masticatory system, including dental occlusion, is important in a number of disciplines; for example, physical anthropology, comparative anatomy, auxology and dental clinical practice. There are many references in the literature to occlusion in the human permanent dentition, but detailed and thorough descriptions of the primary dentition are rare. With recent moves toward early intervention and treatment of developing malocclusions in the late primary and early mixed dentitions, there is a pressing need for more information on the nature and causes of occlusal variation in the primary dentition.

The aims of this study were: firstly, to describe the nature and extent of variation in the primary dentition in a group of singletons, including interdental spacing arch size and shape, and the relationship between opposing teeth; and secondly, to clarify and partition the causes of the variation into genetic and environmental components by studying a group of twins.

A group of 114 singletons, with a mean age of 4.7 years was used to describe the nature and extent of the variation between males and females and results were compared with other published studies. Another group, comprising 80 twin pairs, provided an opportunity to study the causes of variation. The twin group included 35 monozygous and 45 dizygous twin pairs with a mean age of 5.4 years. Zygosity was confirmed by comparison of DNA samples obtained from buccal cheek cells. Information relating to birth weight, birth length and medical histories was obtained through a questionnaire completed by parents.

Comparing the similarity between monozygous and dizygous twin pairs is an efficient and powerful method for detecting genetic and environmental effects on phenotypic variation. In human genetic epidemiological studies, the degree of phenotypic similarity between individuals correlates positively, not only with the degree of genetic similarity, but also the degree of environmental similarity' both pre- and post-natal.

Various measures of occlusal variability including interdental spacing, overbite, overjet, canine and molar relationships, crossbite relationship, arch breadth and depth, and arch shape, were obtained directly from stone models or indirectly from photocopies or impressions of the models. For assessing interdental spacing, impressions of each model, obtained with Examix-Monophase type hydrophilic polyvinyl siloxane material, were sectioned longitudinally and then measurements were made. For the other variables, methods described previously by other authors were used for data collection.

Data were analysed statistically using the software package SPSSX. Descriptive statistics were computed including mean values, standard deviations and coefficients of variation for the continuous variables. T-tests were used to make comparisons between males and females, between left and right sides and between maxilla and mandible. Frequencies of occurrence were computed for the discrete variables and chi-square tests of association were performed between groups and variables. The level of statistical significance was set a $p<0.05$.

The genetic analysis included calculation of correlation coefficients between twin pairs, computation of heritability estimates, and application of a univariate genetic modelling analysis using the programme Mx to partition observed occlusal variation into genetic and environmental components.

Reliability of measurements was assessed by performing double determinations on 10% of the sample, randomly selected from the singleton and twin groups. Statistical tests revealed errors were very small in magnitude and unlikely to bias the measurements.

Mean total spacing in the maxillary and mandibular arches combined was 11.4+2.99mm (mean+SD) in males and 11.7=2.94mm in females. Primate spaces were larger on average in the maxillary arch (1.1+0.65mm) than in the mandibular arch (0.8+0.50mm).

There was a significant difference between the sexes for inter-canine and inter-molar arch breadth in the maxilla and inter-molar breadth in the mandible, males being larger on average than females. Mandibular arch depth was also greater in males. Overbite averaged 1.8+1.32mm and overjet averaged 2.5+1.29mm. Fourth-order polynomials described arch shape adequately and coefficients did not differ significantly between the sexes. The most common types of canine and terminal plane relationships found were Class I (56.8%) and straight terminal plane (75.6%) respectively. The frequencies of occurrence of unilateral and bilateral crossbite were 9.6% and 0.9% respectively.

Estimates of heritability, that is the ratio of genetic to phenotypic variance for the various occlusal variables measured were: overjet- 0.28; overbite- 0.53; interdental spacing between 0.62 and 0.81; arch dimensions between 0.69 and 0.89; and arch shape between 0.79 and 0.87. Genetic modelling indicated that a model incorporating additive genetic and unique environment variation was the most parsimonious for most occlusal variables.

The extent of occlusal variation found in the present study was similar to that described in other published studies. The main findings of this study were: mean total arch spacing was greater in the maxilla than in the mandible; arch dimensions were significantly larger in males than females, except inter-canine arch breadth and arch depth in the maxilla and inter-canine arch breadth in the mandible. This finding may be related, in part, to the consistently larger deciduous crown diameters of boys compared with girls. A significant difference was found in variance for both overbite and overjet between males and females. In the female sample, 13.1% of individuals had an open bite but none of the males showed this feature. Similarly, the maximum recorded overjet for the female sample was 8mm compared with 5.5mm for the male sample.

Open bite and increased overjet have been associated with sucking habits, however, no records were available to check this hypothesis. For arch shape, fourth-order polynomial equations fitted the data well, with all correlations exceeding 0.99. The quadratic and quartic terms reflecting overall arch shape did not differ significantly between males and females, nor did the linear and cubic terms representing arch asymmetry. A Class I canine relationship was the most frequently occurring category in both males and females, and a Class III relationship was the least frequent. A Class I molar or straight terminal plane relationship was the most common molar relationship in both males and females and a Class III or mesial terminal plane relationship occurred least frequently. Most children did not show evidence of a crossbite relationship, and bilateral crossbite was very rare.

"Overbite and increased overjet have been associated with sucking habits..."

Previous heritability studies of occlusal variables have all been conducted on the permanent dentition and to the author's knowledge, no other studies on the primary dentition are available for comparison. Heritability values calculated in this study were generally higher than those reported in earlier studies of the permanent dentition. This may be due to the sensitive nature of the analysis used in this study. However, it should be kept in mind that heritability estimates are specific to a particular population and so comparisons between populations should be carried out with caution. The pattern of heritability values for the various occlusal traits in this study (that is, highest for arch dimensions and lowest for overjet) were similar to previous studies of the permanent dentition. However, whether the primary and permanent dentitions are under control of the same set of genes is not yet known.

This study found that, generally, occlusal variation in the primary dentition appears to be under moderate to high genetic control, with heritability estimates being lowest for inter arch occlusal variables and highest for arch dimensions. The precise nature of environmental influences is still unclear, however, consistency of the diet, heat posture, pre- and post-natal factors and peri-oral muscular activity have all been reported to affect variation in craniofacial morphology.

A longitudinal study would provide further insights into the nature of occlusal variation during the development of the complete primary dentition, and further research involving a multivariate analysis of the twin data to estimate genetic and environmental influences on co-variation within the primary dentition is required.

Recent developments in craniofacial biology have raised the possibility of new approaches in the management of malocclusion. Preliminary results from Finnish trials involving early occlusal and orthopaedic treatment, look promising as an alternative to conventional active treatment during adolescence and adulthood.

If this approach proves fruitful, contemporary orthodontic treatment may fundamentally change direction. Indeed, there is clearly a need for continuing research into the nature and causes of occlusal variation in the primary dentition, particularly from the viewpoint of prevention and early clinical intervention.

The study has presented a comprehensive investigation into occlusal variability in the primary dentition of Australia children. The magnitude and frequency of occurrence of various occlusal features are similar to those found in other populations and confirm that a wide range of occlusal variation exists in the primary dentition.

Anterior and posterior crossbites: An overview

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Program supervisors: Professor Louise Brearley Messer BDSc MDSc PhD, Dr Christopher B Olsen MDSc FRADCS

Introduction

A crossbite is defined as an incorrect labiolingual or buccolingual relationship between maxillary and mandibular teeth (*Abraham & Alexander 1997*). Based on the location of the crossbite in the mouth, it can be defined further according to whether the crossbite is anterior or posterior. The purpose of this paper is to assist the clinician in determining the classification of crossbites in children, the aetiological factors and differential diagnoses, and to select methods of treatment for correction.

Anterior crossbites

Anterior crossbite, a common malocclusion in the mixed dentition, presents as the ectopic eruption of an incisor, either palatally in the maxilla or labially in the mandible, into a crossbite relationship in centric occlusion (*Fricker 1998*). Anterior crossbites can be caused by a dental, functional or skeletal problem. *Dental anterior crossbite* usually involves an abnormal eruption of single incisors (*Major & Glover 1992, Abraham & Alexander 1997*). Various etiological factors may be involved, including: trauma to primary incisors with displacement of the permanent tooth bud, delayed exfoliation of the primary incisor with palatal deflection of the erupting permanent incisor, supernumerary anterior teeth; odontomas, and crowding (arch perimeter deficiency) (*Major & Glover 1992*).

Multi-tooth anterior crossbites can be the result of an abnormal relationship in centric occlusion between the maxilla and mandible, due to incisal interference, which causes the forward displacement of the mandible to achieve maximum inter-cuspation (*Abraham & Alexander 1997*). This type of crossbite can be called a *functional anterior crossbite (Pseudo class III)*. This habitual displacement of the mandible can affect the growth of both the maxilla and the mandible with undesirable muscular adaptation (*Fricker 1998*).

A more severe anterior crossbite, *skeletal anterior crossbite,* is the result of a skeletal discrepancy that leads to a class III malocclusion (*Abraham & Alexander 1997*). While the incisors are positioned correctly within the alveolar ridges, there is negative overjet on closing into centric occlusion with no deviation on mandibular closure (*Fricker 1998*).

Posterior crossbites

Posterior teeth presenting an abnormal bucco-lingual/transverse relationship are described as being in crossbite (*Koblan et al 1997*). There are three types of posterior crossbites: dental, functional and skeletal. *Dental posterior crossbite* usually involves a single tooth tipped/tilted into linguoversion or labioversion (*Abraham & Alexander 1997, Fricker 1998*). *A skeletal posterior crossbite* is usually bilateral, resulting from a narrow maxilla relative to the mandible (*Proffit et al 1993, Abraham & Alexander 1997*). This type of crossbite is always classified as a severe transverse discrepancy and requires early orthodontic intervention. The unilateral posterior crossbite is often a "mask" for a bilateral crossbite. The displacement of the mandible, to achieve better intercuspation, results in the appearance of a unilateral crossbite, the so-called *functional posterior crossbite* (*Abraham & Alexander 1997, Fricker 1998*). One indication of this is the appearance of a dental midline discrepancy. The key to a differential diagnosis is evaluating the patient in a centric position. While guiding the mandible to close, the condyles should be in a fully retruded position. At the point of tooth contact the occlusion should be inspected. The obvious cusp-to-cusp buccolingual relationship of the buccal teeth on one side and the obvious lateral slide of the mandibular midline, suggests that there is a displacing activity on full closure (*Ninou & Stephen 1994*).

There are many etiological factors causing posterior crossbites. Dental factors include an abnormal eruption pattern, lack of arch length resulting in a buccal or lingual eruption path, prolonged retention of primary teeth and aberration in tooth anatomy (*Dolce 1996, Fricker 1998*). Skeletal factors include a unilateral or bilateral cleft palate and abnormal growth of the bones of the craniofacial complex because of either genetic (cerebral palsy etc.) or environmental factors (*Dolce 1996, Fricker 1998*). Muscular factors include mouth breathing causing the mandible to drop and leading to a constricted maxilla or palatal tipping of the maxillary teeth; and sucking habits and occlusal interferences causing mandibular displacement (*Dolce 1996, Fricker 1998*).

Diagnosis of dental and skeletal crossbites must be made accurately through clinical examinations, panoramic radiographs, lateral and postero-anterior cephalometric radiographs and study models to distinguish the skeletal relationship of the maxilla to the mandible. Any type of crossbite is best treated as soon as it is diagnosed so that growth of the jaws, teeth, and temporomandibular joints is not impeded and function is not impaired (*Abraham & Alexander 1997*).

Management of anterior crossbites

The management of anterior crossbites can be classified according to non-skeletal and skeletal anterior crossbites. This review will address with the management of non-skeletal anterior crossbites as they are more commonly addressed by paediatric dentists; skeletal crossbites are not suitable for the treatment approaches to be addressed below.

1. Inclined Plane

   An inclined plane fitted/cemented to the mandibular incisors is one treatment approach to manage the anterior crossbite associated with mandibular displacement. It restricts the forward posturing of the mandible and places pressure on the palatal of the maxillary incisors to push them labially (*Fricker 1998*). Only the inlocked tooth should be

in contact with the inclined plane, and the plane should not touch the palatal tissue. Treatment is usually complete within a month. This appliance works best where there is a slight overbite which helps to retain the incisors in positive overjet once the appliance is removed.

The over-eruption of posterior teeth and a tendency to an open bite in the anterior region are the most common undesirable effects of using an inclined plane (*Cameron 1997*). These complications can occur within 10 days, so it is advisable that the patient should not wear the inclined plane for longer than six weeks.

2. Tongue blade

When a single permanent incisor is still erupting and in crossbite without an excessive overbite, a tongue blade may be used to achieve a correction (*Fricker 1998*). The tongue blade is placed lingual to the maxillary incisor tooth in crossbite and the patient closes the mandibular incisor teeth firmly against the blade. This method is very unpredictable as the result is dependent upon the frequency of patient use and the patient's tolerance to the discomfort that occurs (*Ngan et al 1997*). It usually requires six sessions daily each lasting at least 30 minutes. Tenderness will occur after the first day of use, and if the patient discontinues the exercise for one or two days, the crossbite will return (*Fricker 1998*).

3. Removable Appliances

A modified Hawley appliance can be used to correct one or two maxillary incisors in crossbite. It is sometimes helpful to cover the occlusal surfaces of the posterior teeth to open the bite and allow free labial movement of the teeth in crossbite; however, this is not necessary in every case. Adam clasps are placed on the first permanent molars with a labial arch wire, and if primary molars are present, ball ended clasps can be placed to engage the retention of the appliance (*Proffit et al 1993, Fricker 1998*). A 0.5-0.6 mm diameter finger spring with double helix or a z-spring is placed palatally to the malposed tooth. The patient is seen every four weeks to activate the spring (1.5-2mm/visit). After the affected tooth is correctly positioned, the occlusal acrylic overlaying the posterior teeth can be trimmed down to allow the bite to close. The appliance should be worn 24 hours per day except while eating, brushing teeth and playing sport. Therefore, excellent patient co-operation is required. The offending tooth should be slightly overcorrected and the appliance should be retained until the overbite is adequate to retain the corrected tooth position. The same appliance can be used as a retainer to stabilise the occlusion for about three months (*Fricker 1998*).

4. Fixed Orthodontic Bands & Brackets

Fixed appliance therapy using orthodontic bands cemented on to first molars and brackets bonded on to incisors is an alternative treatment to manage two or more incisors in crossbite. This may be the best choice for older mixed dentition patients with crowding, rotations and several permanent teeth in crossbite (*Proffit et al 1993*). After the teeth have been moved to their ideal position, they should be stabilised for one to two months before debanding, and then further retained with a passive removable appliance for approximately three months (*Proffit et al 1993*).

Other methods for correction of an anterior crossbite include the reverse stainless steel crown (SSC), resin composite slope, disking, or extraction of the adjacent primary teeth to provide the necessary space for crossbite correction. The reverse SSC and composite slope have the disadvantages of difficult adaptation and the unattractive appearance of the SSC, and the difficulty of removing the composite after the correction of the crossbite by a composite slope (*Proffit et al 1993, Croll 1996, Ngan et al 1997, Croll &Lieberman 1999*).

The management of skeletal anterior crossbites usually attempts to protract the maxilla in a growing child or to use surgical correction when growth is completed (*Abraham & Alexander 1997*). The appliances used for correction of skeletal anterior crossbites include protraction headgear, the functional regulator of Fränkel and the chin cup (*Major & Glover 1992, Ngan et al 1997*). *The protraction headgear* in conjunction with a palatal expansion appliance has been used to correct patients with maxillary deficiency and/or mandibular prognathism (*Ngan et al 1997*). This appliance should be considered for patients presenting with a retrusive maxilla and inadequate or normal incisor display and lower facial height (*Major & Glover 1992*).

The chin cup appliance has been used in the mandible since the 1800's to help reduce a prognathic dentition. This method has shown variable results, with variations rising from an inappropriate amount force, little understanding of facial growth, and use of the chin cup after completion of skeletal growth (*Graber 1977*). A chin cup should not be used in patients with skeletal class III malocclusion due to maxillary antero-posterior deficiency (*Sugawara et al 1990*). *The functional regulator of Fränkel* is designed to counteract the muscular forces acting on the maxillary complex. This method may reduce facial height. This appliance would not be the ideal choice for treatment of patients who present with maxillary antero-posterior deficiency (*Ngan et al 1997*).

Management of posterior crossbites

1. Crossbite elastics

When only a single permanent molar is in crossbite, it can be corrected easily using a crossbite elastic. When using a crossbite elastic, the position of buttons or hooks is dependent upon the type of crossbite (*Dolce 1996, Fricker 1998*). For a lingual crossbite, the button is placed on the lingual surface of the maxillary tooth and on the buccal surface of the mandibular tooth. In a buccal crossbite, the button placement in reversed. An elastic (1/4 inch, 3 1/2 oz, 100g) is stretched between these buttons and worn 24 hours per day, except during brushing and flossing teeth, and is changed at least twice daily or every time the elastic breaks (which is often) (*Dolce 1996, Fricker 1998*). With continuous wearing of the elastics, the crossbite should be corrected within three to four months. A unexpected result of wearing elastics can be supra-eruption of teeth (*Dolce 1996*).

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2. Fixed Appliances

2.1 The quad helix appliance

For more severe lingual crossbites involving more than one tooth and a mandibular displacement, a quad helix is recommended. This appliance is constructed of molar bands on the first permanent molars and a soldered 0.036 inch stainless steel (or 0.038 inch blue Elgiloy) wire with two anterior helices and two posterior molar helices (Figure 1). (*Henry 1993, Dolce 1996, Fricker 1998, Pinkham 1999*). The anterior bridge with helical loops is placed on the palatal surface. The posterior helical loops are placed slightly posterior to the solder area. The lateral arms are adapted to the lingual surface of posterior teeth and are extended from the solder area to the canine. The appliance is located 1.0 to 1.5 mm off the palate to avoid soft tissue irritation. A quad helix is usually activated once per month. For proper activation the appliance should be removed from the mouth; however adjustments can be done intraorally with care, using three-prong pliers. The first adjustment is at the anterior bridge and the second and third bends are made at the posterior 1/3 of the palatal bridges (*Henry 1993*). The expansion should continue until the molars are overcorrected, then retained for 4-6 months followed by retention. The 3-4 weeks regular monitoring is recommended. This appliance requires little cooperation from the patients or parents apart from avoiding sticky foods, and maintaining good oral hygiene.

2.2 The Rapid Maxillary Expansion appliance (RME)

The use of a RME appliance is required for a patient with bilateral constriction of the maxilla and a need to increase the maxillary width (*Dolce 1996*). The Hyrax type appliances are most commonly used. The Hyrax jackscrew is soldered to bands cemented onto the permanent maxillary first molars and first premolars. The screw is turned 1-2 times/day by the parent, with each turn corresponding to 0.25 mm of expansion, for 3-4 weeks. Patients should be monitored once per week. During the expansion period, a diastema will show between the central incisors, indicating a splitting of the mid palatal suture. Patients and parents need to be advised of this in advance. The same appliance is maintained as a retainer for another 3-6 months (*Dolce 1996, Abraham & Alexander 1997, Fricker 1998*).

Since RME involves the opening of the mid-palatal suture, the proper orthodontic diagnosis should be made before the treatment. This procedure should not be attempted on a patient over the age of 16 or 17 years when the palatal suture is normally completely closed.

3. The Removable Appliance

The removable split acrylic palatal expansion appliance can be used for a mild unilateral lingual crossbite. A jack screw is fixed in the midline of the device. The screw is activated _ turn one to two times/week. The appliance is worn at all times, except when eating or brushing. This appliance relies on the patient's co-operation and the retention of the appliance.

Conclusion

Crossbites present commonly in growing children and require intervention as soon as they are discovered. There are a variety of treatment options. Effective and efficient treatment is dependent upon a proper understanding of the patient's problem, including accurate clinical examination and diagnosis, and the utilisation of an appropriately selected appliance together with good patient motivation and compliance.

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AUSTRALIAN & NEW ZEALAND TEACHERS OF

Paediatric Dentistry

The General Meeting was held at the 12th ANZSPD Biennial Conference 25th February 2000 Hyatt Regency Adelaide. The meeting was asked to consider, as well as the normal business of the General Meeting, the role and more so the future of the group in post graduate and undergraduate teaching of paediatric dentistry.

Members felt that the group as a whole was sizeable enough to participate in the discussion of teaching issues bearing in mind that only a minority of members were full-time academics.

The fact that several members were also in the Australian Academy of Paediatric Dentistry would serve to ally the two groups and thus avoid the need for the teachers to abandon their group.

It was suggested that teachers from each Dental School could give a summary of their teaching activities at future meetings with various reports and presentations along the lines of the Academy scientific day.

While the group may not have much influence on dental manpower needs throughout Australia and New Zealand it could, perhaps, monitor student numbers and teaching requirements accordingly.

Traditionally the Executive rotates from State to State (whichever is responsible for staging the Biennial ANZSPD meeting providing both the President and Secretary).

The current office bearers are;

President	Dr Kerrod Hallett
Secretary	Dr Laurie Bourke
NSW	Dr Angus Cameron
Qld	Dr Laurie Bourke
Vic	Dr Chris Olsen
SA	Dr Joe Verco
WA	Dr John Winters
NZ	Dr Bernadette Drummond

The next meeting is to be held in conjunction with the 13th Biennial Meeting of ANZSPD in Brisbane, 2002.

Dr Laurie Bourke

Obituary

ARTHUR (MAX) HORSNELL, AO Emeritus Professor, University of Adelaide. LDSRCS (Eng), FRACDS, FDSRCS, MRCS, LRCP. 1912 –1999. A GREAT FRIEND OF PAEDIATRIC DENTISTRY.

Max Horsnell was a great friend of Paediatric Dentistry and a founding father of both the British Paedodontic Society and the Australian and New Zealand Society of Paediatric Dentistry.

Max was born in Brentwood, Essex, England on July 6th ,1912. After attending Brentwood School, he studied at the London Hospital Medical School graduating in Dentistry in 1934 and in Medicine in 1939. He served as a medical officer in RAF, with the rank of Squadron Leader, during World War II.

In 1948 he returned to ' The London', becoming Director of the Department of Conservative Dentistry and then, in 1949, Sub-Dean for Dental Studies. Realising that the Dental School had to double in size in order to survive, he persuaded the Medical School to adopt his ideas and alterations to the existing school began in 1952,with the Medical School, in 1956, agreeing to the building of a new Dental School .

Max had always had an interest in the dental care of children, and he enthusiastically supported a move by George Scott Page, Peter James and Leonard Morey (who had been strongly influenced by Sam Harris and George Teuscher in the USA and Guttorm Toverud in Scandinavia), to form an embryonic society for those interested in children's dentistry. Max chaired the inaugural meeting in September 1952, of ten dentists who decided to form The London Study Group in Children's Dentistry, which in 1958 became The London Society for the Study of Dentistry for Children. That same year, Max was made an Honorary member and when in 1962, the name was changed to the British Paedodontic Society, Max Horsnell thus became the first Honorary Member of the British Paedodontic Society.

In 1959 Max and his family moved to Australia to take up the position of Professor of Dental Science in the University of Adelaide and was immediately involved in the building of the second stage of the new Adelaide Dental School. He was active on Australian Dental Association committees and was a member for 20 years of the WHO Advisory Panel on Dental Health.

In 1967 Max was one of the speakers at a Symposium on Dental Care for the Handicapped with a number of invited international speakers organized at the Royal Children's Hospital by Roger Hall; most of the Australians present were involved in the dental care of children. In 1973, when Roger Hall and John Keys jointly formed the Australian Society of Dentistry for Children (later to become the Australian and New Zealand Society of Paediatric Dentistry), Max was elected inaugural Vice-President, subsequently becoming President from 1976 to 1978. At the 9th Congress of the International Association of Paediatric Dentistry held in Melbourne in 1983, he was responsible for the organization and conduct of the Opening Ceremony attended by the, then Governor General of Australia, Sir Ninian Stephen. Max's experience with the British Paedodontic Society and his committee experience was invaluable to the Australian and New Zealand Society for Paediatric Dentistry in its formative years.

On Max's retirement, his huge contribution to the University of Adelaide was recognized by the award of the title of Emeritus Professor, and in 1984 he was made an Officer of the Order of Australia.

Dr Roger K Hall

Federal Secretary-Manager's Notes

The Federal Council of the Society met on Wednesday, 23rd February 2000 in Adelaide. It was a busy meeting.

Among the matters covered were the following:

1. Election of Office Bearers.

   President: Dr Kerrod Hallett
   Vice-President: Dr Chris Olsen
   Synopses Editor: Dr John Winters
   Secretary - Manager: Dr Alistair Devlin

2. Future Meetings.

   Federal ADA Congress, 4 - 8 May 2001, Brisbane, Queensland.

   IAPD Congress, 13 - 15 September 2001, Paris, France.

   R K Hall International Visiting Lecturer, probably October or November 2001. This visit is being co-ordinated by the WA Branch. A speaker has been approached and a final response is awaited. It is envisaged the speaker will visit Perth, Sydney, Hobart, Auckland and Christchurch,

   13th ANZSPD Convention, 3 - 5 October 2002 in Queensland.

   I.A.P.D. Congress, 16 - 19 October 2003, New Orleans, USA.

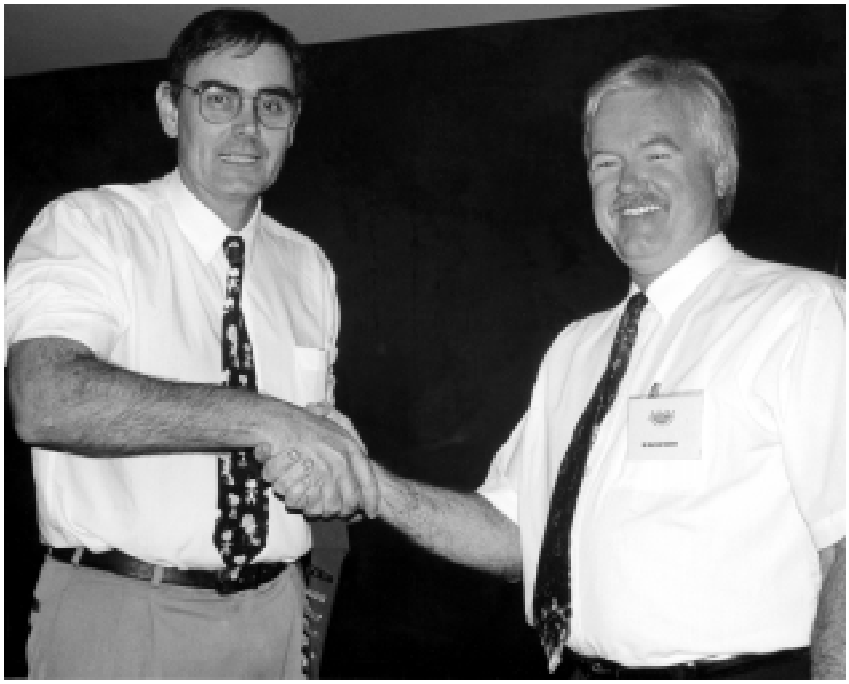
3. Essay Competitions 2000.

   Postgraduate Competition
   "The Effects of Medication on Oral Health. Myths and Realities."

   Undergraduate Competition
   "Evidence Based Preventive Dentistry. Discuss the scientific evidence for commonly prescribed preventive strategies in clinical practice."

   Both competitions are open to students in New Zealand and Australia. The closing date for entries is Friday, 1st September 2000.

   Incidentally, the postgraduate competition is co-sponsored by the Federal body and the Victorian Branch. The winning essays will be published in 'Synopses'.



Above: Dr Richard Widmer congratulates Dr Kerrod Hallett on his succession to the Federal Presidency of ANZSPD.

4. The International Association of Paediatric Dentistry has initiated a drive for members. To this end, if over 50 members can be recruited from New Zealand and Australia, ANZSPD could become a "flagship" Society for the Journal of IAPD, following the lead of the British and Irish Societies.

   To encourage this, IAPD has offered a very favourable discounted subscription rate provided the increase in numbers occurs. The Federal Council decided to embrace the plan, but on a voluntary basis. To put this into effect, all branches will be receiving a membership form, which will be distributed to all members each year (when the annual membership renewal notice is posted out). This form will allow members to elect if they wish to become IAPD members, and to pay the necessary extra subscription.

   Such membership includes subscription to the Journal (four a year). The discounted cost looks like being about two thirds the usual cost.

5. Whilst on the subject of recruiting members, ANZSPD is also keen to see new members, particularly amongst new graduates.

   To help this, the Federal body is offering a 20% reduction in the Federal subscription to first year graduates, provided this reduction is matched by the provincial branch with their branch subscription.

6. One of the realities of paediatric dentistry is that much of the treatment is provided by various types of dental auxiliaries.

   Federal Council was of the opinion it is eminently sensible for ANZSPD to honour Article 2 of the Constitution, which states:

   "the objects of the Society shall be the study and advancement of paediatric dentistry, and the promotion of education in the field of paediatric dentistry."

   In this regard, it was decided to move towards formally establishing a category of Associate Member of ANZSPD.

7. ANZSPD has sponsored the travel to two IAPD Congresses of two dentists from Papua New Guinea. As an extension of this idea, in an attempt to encourage the spread of the paediatric dental word in third world countries in our region, ANZSPD is looking at establishing a "ANZSPD Visiting Fellowship". The aim will be to assist with the cost of travel of suitable visitors from the Asian Pacific region to ANZSPD Conventions.

8. Many Australian members will have wrestled with the new 6th Edition of the ADA Glossary. A number of specific examples of dissatisfaction with this new document were brought to the attention of the Federal Council.

   Contact with members of the ADA Schedule Committee indicated that the best course of action to take is for members to put their concerns in writing, and send them to the Schedule Committee, care of the Federal ADA Office.

9. Members will be aware of the success of the bid by ANZSPD to host the 2005 IAPD Congress in Sydney.

   At the General Meeting of the Society, held at the Adelaide Convention, Immediate Past President of ANZSPD, Associate Professor Richard Widmer, was elected as Chairman of the Organising Committee for this twentieth IAPD Congress.

   Also at the General Meeting it was decided to increase the annual Federal Subscription to AU$40.00. This will be the first increase in this subscription since 1986. One reason is the desire to increase the financial reserves of ANZSPD as an insurance, ahead of the 2005 IAPD Congress.

10. The Federal Council has decided to acquire a "Presidential Honour Board": It will be a 600mm by 500mm jarrah board which will list the ANZSPD Presidents, in addition to the Presidents of the New Zealand and Australian Societies of Dentistry for Children up to 1988, when ANZSPD was formed.

Alistair Devlin.

Western Australian Branch Notes

1. The Annual General Meeting and Dinner of the Branch was held on 26th November 1999 at the alfresco Bibendum Restaurant in the Perth suburb of Subiaco. A fine meal was enjoyed, and this was wrapped up with a talk by Mr Nick Bath, who is the Managing Director of the Blue Cow Cheese Company. The talk was enhanced by a tasting of four of the products of the Company. At the business meeting which preceded the dinner, the following office bearers were elected:

   President:
   - Dr John Winters

   Secretary - Treasurer
   - Dr Alistair Devlin

   Committee Members:
   - Dr Peter Dillon
   - Dr Kate Dyson
   - Dr Mark Foster
   - Dr Tim Johnston
   - Dr Nita Pai
   - Dr Peter Readman

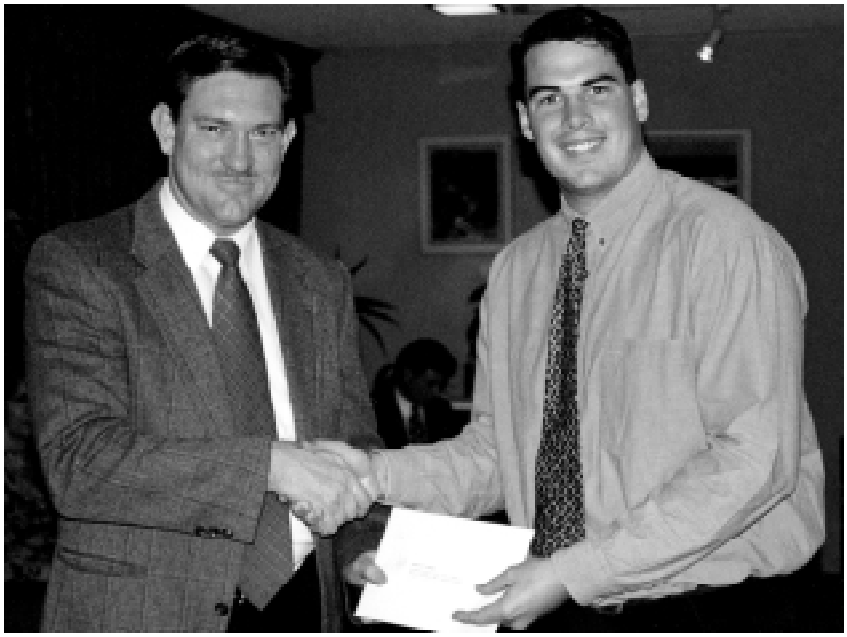
2. The first meeting for 2000 will be a limited attendance meeting at the new CTEC building on the campus of the University of Western Australia. This building was opened by HRH Queen Elizabeth II during her recent visit to Perth. It provides clinical training units, and it is with the anaesthetic simulator that this meeting will be involved.

3. This year will see the revival of the "Current Controversies in Paediatric Dentistry" meetings after an absence of a number of years. The meeting will be on Wednesday, 23rd August at the MacDonald Lecture Theatre at the Princess Margaret Hospital for Children. The area to be under the microscope this year will be the "Emergency Management of Paediatric Dental Trauma".

4. On 10th November, the Branch will conduct it's annual one day course. The guest speaker on this day will be the Federal ANZSPD President, Dr Kerrod Hallett. The course will be held at the Hyatt Regency Hotel.

5. The winner of the ANZSPD (WA Branch) Prize, as the best student in paediatric dentistry in the final year of the dental science degree course at the University of Western Australia was Dr Dieter Gebauer. His prize was presented to him by Branch President, Dr John Winters, at the annual Prize - giving Ceremony on 5th April 2000.

Alistair Devlin

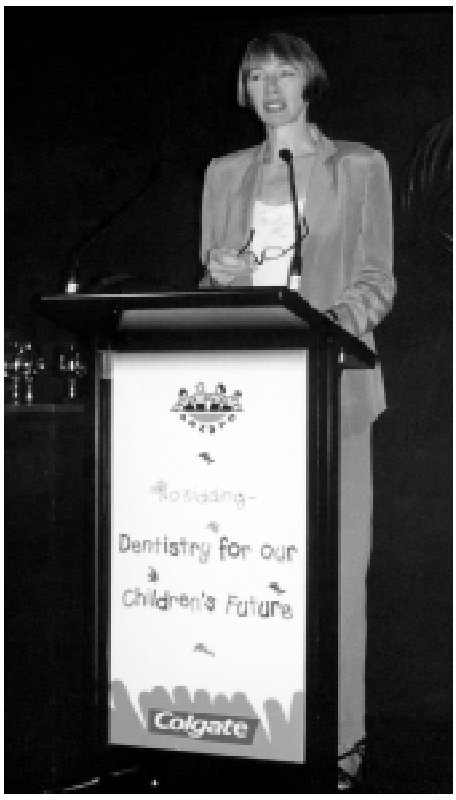


Above: Dr Dieter Gebauer (right) is presented with the ANZSPD (WA Branch) Prize by Dr John Winters.

12th Annual ANZSPD Biennial Convention Report

Without wishing to enter the controversy as to whether we have, in fact, entered the new millennium or not, the ANZSPD Convention held at the Hyatt Regency Hotel in Adelaide from the 24th to the 26th of February 2000, was either, as a Convention, a fitting way to send off the old millennium or a grand way to welcome the new one. In the first instance, over two hundred "backsides on seats" (ie just over two hundred registered) was always a good way to ensure the Convention was going to be a success. Of course, that still meant there was a need for a quality scientific and social program. There would be very few of those who attended who would have felt shortchanged on either of these counts.

Before the official opening, there had already been much activity. The Federal Council had met on the Wednesday evening, and then the Australasian Academy of Paediatric Dentists had met all day Thursday. The Academy had spent most of that afternoon progressing the "Standards of Care in Paediatric Dentistry" document. It is hoped this project, which had begun in Adelaide in May 1999, will be close to a final draft by the time the Academy meets in Brisbane in May 2001.



Above: Adelaide Lord Mayor Dr Jane Lomax-Smith opens the ANZSPD 12th Biennial Convention

Following the Academy meeting, the Convention proper was under way with the opening Cocktail Party. Registrants were welcomed by the outgoing Society President, Richard Widmer, who took the opportunity to thank the major sponsor of the Convention, Colgate Oral Care. Richard was conspicuous, wearing the Society Presidential Chain of Office with pride. It also allowed him to be distinguished with ease from some other conspicuous attendees. These included a ventriloquist, an incredibly flexible contortionist, a "Sir Les Patterson" look alike and a pregnant Dr Sarah Raphael!

The official opening of the Convention began proceedings on Friday morning. The Lord Mayor of Adelaide, Dr Jane Lomax - Smith, was introduced by Richard Widmer. Dr Lomax - Smith gave a most impressive address - she is a pathologist by profession, but it is the world of politics which beckons her. Based on this performance, she is destined to have a bright future in that field. Professor Nigel King, a good friend of paediatric dentistry in Australia and New Zealand, opened the scientific program with a look at Ectodermal Dysplasia. This was from a south - east Asian perspective - Nigel has been in Hong Kong for a number of years.

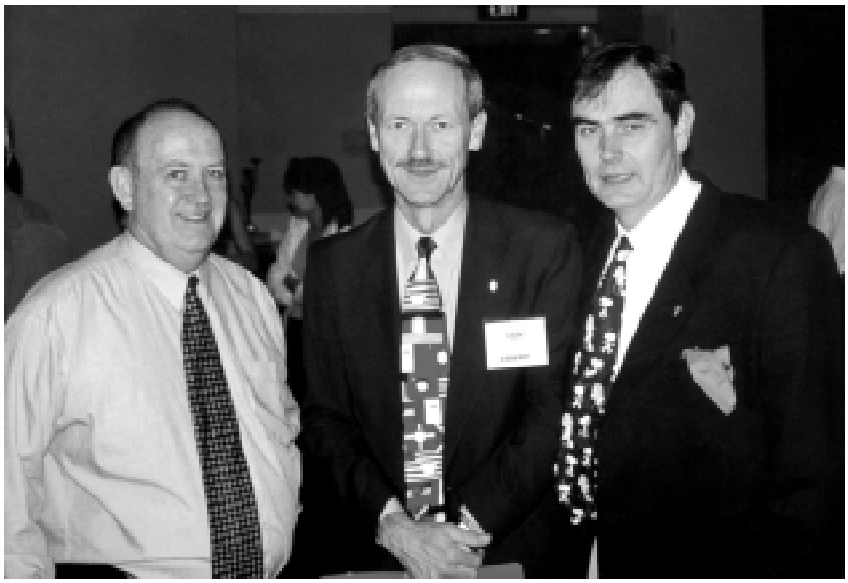
Nigel was followed by Associate Professor Kim Seow of Queensland. Kim gave a most thought provoking lecture on "Occult Caries", in which she posed some interesting questions about the aetiology of this disease process. Was it in fact a resorptive process which began before the tooth had even erupted? All of us will be looking at unerupted teeth on O.P.G. radiographs with a critical eye from now on.

The morning session was wound up by Dr Nina Vasan from Auckland. The basis of Nina's lecture was her prize winning 1998 ANZSPD Postgraduate Essay, which was published in the May 1999 edition of *Synopses*. Nina expanded this lecture to look at sports dentistry in general, an area of great and expanding interest with dentists and the general public alike.

The afternoon session saw the six competitors in the Colgate Postgraduate Research Project in Paediatric Dentistry Award present their papers. This competition was won by Dr Sam Gue of the University of Sydney, with his presentation: "The apototic response of endothelial cells to pulsatile and oscillatory shear stress." Sam's prize, which is donated by Colgate, is return air travel to an international paediatric dentistry conference where he may present this same paper. Any of the six competitors would have been a worthy winner. There was some justified disquiet expressed about the manner in which the competition was administered and conducted. In no way could this detract from Sam's most deserved win, nor from the efforts of the other competitors. The ANZSPD Federal Council will definitely be looking at measures to tighten up the running of this very important competition.

Associate Professor Martin Tyas from Melbourne concluded the scientific programme for the first day with a detailed look at the restoration of primary teeth, in particular the evidence to support the use of resin, glass ionomer and the various combinations of these materials. This included a critical look at the atraumatic restorative treatment idea, especially in third world countries, and it would seem to be beyond question that the method has a place in these sorts of circumstances. Martin provided a well researched and thoughtful presentation.

The evening saw the official Convention Dinner, and what a magnificent event it turned out to be. The venue was the historic Ayers House in North Terrace in Adelaide, where, incidentally, the Convention Dinner was held when the ANZSPD Convention was last in Adelaide in 1986. Richard Widmer welcomed two very special guests - Marian Allen, widow of one of the fathers of paediatric



Above: Dr Jeff Wright – Convention Organizer, Dr Alistair Devlin – Federal Secretary Manager, ANZSPD, Dr Richard Widmer – Federal President, ANZSPD.

dentistry in Australia, Kevin Allen, and Leigh Bubb, widow of Michael Bubb, who was responsible for forging the close relationship which exists between Colgate and ANZSPD. In a lovely gesture, Richard celebrated the contributions of Kevin and Michael to paediatric dentistry by leading a rousing three cheers. The meal was of the highest quality, a description which also fitted the entertainment for the night, a performance of some popular operatic favourites by members of the South Australian Opera Company. It was most appropriate entertainment in a venue of that class.

Not surprisingly, not everybody was there for the first lecture the next morning. They were probably regretting the overindulgence of the previous evening - they would also regret missing the lecture presented by Professor Adrian Bauman. Adrian is from the University of New South Wales, and his topic, Adolescent Risk Behaviour, was riveting. From the statistics he presented, society will need to address the great and growing problems which are confronting and, in some instances, overwhelming many of today's youth. His lecture was followed by the double act from Melbourne - Professor Louise Brearley Messer and Dr Nicky Kilpatrick. They successfully reinforced that often repeated message of the importance of caring for and retaining the primary dentition.

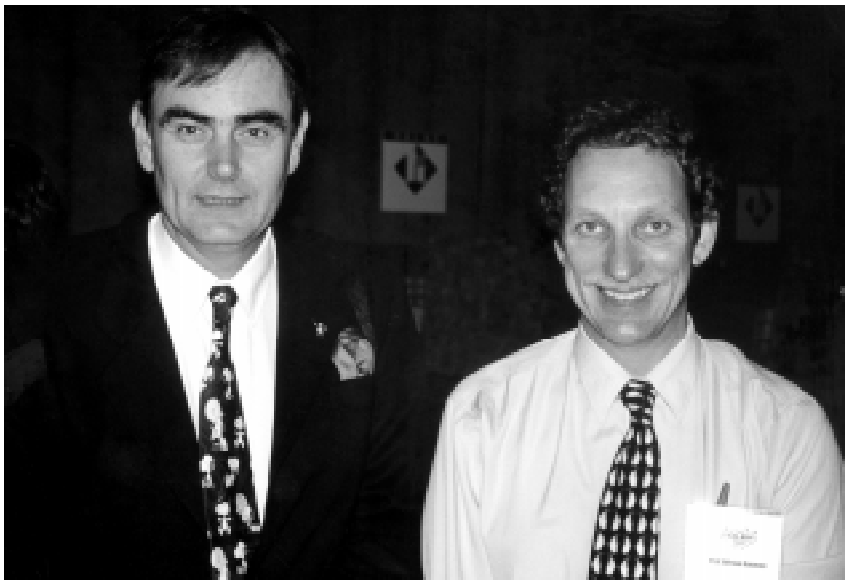
Saturday afternoon saw Nigel King and Kim Seow return to the lectern, Nigel speaking on dental anomalies in a southern Chinese population and Kim speaking on enamel hypoplasia and the problems presented in the management of the condition.

The General Meeting of the Society was held at the end of the afternoon, before a final farewell party in the Hyatt Hotel Disco. This event was generously sponsored by the 3M Company. Entertainment was provided by the Brown Brothers - no, not the wine makers, but appropriately enough for a paediatric dental meeting, by a foursome featuring a 12 and a 9 year old. These boys were sensational! It will be interesting to see how far they can progress in the popular music scene. They could climb to the top.

Sunday saw an intrepid band front up to the Adelaide Railway Station for the Bluebird Barossa train trip. This day was sponsored by Espe Australia, and what a magnificent way to put the cream on the cake of this Convention. The train trip was followed by a bus trip to a number of well known vineyards, including Penfolds, Richmond Grove (home of the annual Concert Under the Stars) and Grant Burge. It was a contented if weary group which disembarked at the railway station at 5:00pm.

Convention Organiser, Dr Jeffrey Wright promised a memorable Convention in Adelaide, and he delivered. In addition to his own incredible efforts, he was well assisted by his wife, Pam, and the rest of the staff at his practice. But Jeff himself was quick to praise the Hyatt Regency Hotel for their professional, courteous and efficient handling of the event, and that was there for all to see. The arrangement of morning and afternoon tea and lunch in the same area as the trade display was a real winner, and one that other meeting organisers could well emulate.

And so we look forward to the thirteenth Convention in Queensland in October 2002. If something similar to Adelaide in February 2000 is on offer, don't miss it!



Above: Dr Richard Widmer and Professor Adrian Bauman

Coming events

- 88th FDI Annual World Dental Congress. Paris, France. 29 November - 2 December, 2000.

  Contact Mr Paul Wilson, FDI World Dental Federation Congress & Exhibition, 7 Carlisle Street, London, England W1V 5RG.

- 7th World Congress on Preventive Dentistry. "Prevention in the 21st Century." Beijing, China. 24-27 April, 2001.

  Secretariat Office National Committee for Oral Health. 38 Baishiqiao Road, Haidian. Beijing, 100081, China.

  Congress Web Site:
  http://www.ciccst.org.cn/wcpd

- Australasian Academy of Paediatric Dentistry. Pre-Congress Meeting. Brisbane, Australia. 3-4 May, 2001.

- 30th Australian Dental Congress. Brisbane, Australia. 4-8 May, 2001.

  Contact Congress Secretariat, PO Box 1280 Milton, Qld. 4064
  e-mail: ada2001@im.com.au

- 9th International Congress on Cleft Palate and Related Craniofacial Anomalies. Göteborg, Sweden, 24-28 June 2001.

  Contact Conference Secretariat, Congrex Göteborg AB, Box 5078, SE 402 22 GÖTEBORG, Sweden.

- IAPD Congress, Paris, France. 13 - 15 September 2001.

- 89th FDI Annual World Dental Congress. Kuala Lumpur, Malaysia. 16-19 September, 2001.

  Contact Mr Paul Wilson, FDI World Dental Federation Congress & Exhibition, 7 Carlisle Street, London, England W1V 5RG.

- 13th Australian and New Zealand Biennial Conference. Brisbane, Queensland. 3 - 5 October 2002.

- IAPD Congress. New Orleans, USA, 16 - 19 October 2003.

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Submissions

All text for inclusion in Synopses must be submitted to the editor on floppy disk, zip disk, CD, or by e-mail. Both PC and Mac formats are accepted. Media will not be returned. Address e-mail to winters@q-net.net.au. Please enclose your contact details and e-mail address with all submissions.

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